

CLAIMS

We claim:

1. A non-planar chemical preconcentrator, comprising:
a substrate having a suspended membrane formed thereon,
at least one resistive heating element disposed on a surface of the suspended membrane,
- 5 a sorption support structure disposed on a surface of the membrane,
a sorptive material disposed on the sorption support structure to sorb and concentrate at least one chemical species from a sample fluid, with the chemical species being releasable from the sorptive material upon heating of the sorptive material by the at least one resistive heating element.
2. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a material selected from the group consisting of dielectrics and semiconductors.
3. The non-planar chemical preconcentrator of claim 2, wherein the sorption support structure comprises silicon.
4. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a material selected from the group consisting of silicon, polycrystalline silicon, silicon nitride, silicon oxynitride, and silicon carbide.
5. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a plurality of concentric hollow cylinders.
6. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a plurality of fins.
7. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a plurality of posts.
8. The non-planar chemical preconcentrator of claim 1, wherein the sorption support structure comprises a honeycomb structure.

9. The non-planar chemical preconcentrator of claim 1, wherein the suspended membrane is selected from the group consisting of semiconductors and dielectrics.
10. The non-planar chemical preconcentrator of claim 9, wherein the suspended membrane comprises silicon nitride.
11. The non-planar chemical preconcentrator of claim 1, wherein the suspended membrane comprises a material selected from the group consisting of silicon, polycrystalline silicon, silicon nitride, silicon oxide, silicon oxynitride, and silicon carbide.
12. The non-planar chemical preconcentrator of claim 1, wherein the suspended membrane comprises a polymer layer.
13. The non-planar chemical preconcentrator of claim 1, wherein the at least one resistive heating element comprises a metal or metal alloy.
14. The non-planar chemical preconcentrator of claim 1, wherein the at least one resistive heating element comprises doped semiconductor material.
15. The non-planar chemical preconcentrator of claim 1, wherein the at least one resistive heating element comprises a circuitous conducting trace.
16. The non-planar chemical preconcentrator of claim 1, wherein the sorptive material comprises a microporous material.
17. The non-planar chemical preconcentrator of claim 16, wherein the sorptive material comprises porous silicon.
18. The chemical preconcentrator of claim 1, wherein the sorptive material comprises a sol-gel oxide.
19. The non-planar chemical preconcentrator of claim 1, wherein the sorptive material comprises a polymer.
20. The non-planar chemical preconcentrator of claim 1, wherein the sorptive material comprises a particulate material.

21. The non-planar chemical preconcentrator of claim 20, further comprising at least one packing stop to retain the particulate material.
22. The non-planar chemical preconcentrator of claim 1, further comprising at least one hole formed in the suspended membrane for flow of the sample fluid therethrough.